AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for generating a space-time trellis code (STTC) for maximizing space-time diversity gain and coding gain in a mobile communication system including at least two transmission antennas, the STTC having an information data bit stream comprised of a number of bits ~~and generating a second number of STTC codes with an information data bit stream upon receiving the information data bit stream comprised of a first number of bits~~, the method comprising the steps of:

calculating a minimum effective length for each ~~of the STTC codes~~ information data bit stream;

calculating product distances between ~~all STTC codes~~ information data bit streams having a length equal to the minimum effective length, wherein for each pair of ~~pairs of~~ all initial states and all end states for each of the ~~STTC codes~~ information data bit streams, initial states are identical to end states;

summing reciprocals of the calculated product distances ~~between all the STTC codes for each of the STTC codes,~~ and calculating minimum average product distances by determining a reciprocal of the summation result; and

generating a STTC code corresponding to an ~~selecting as an STTC code corresponding to the~~ information data bit stream ~~an STTC code corresponding to a minimum average product distance~~ having a maximum value among the calculated minimum average product distances.

2. (Currently Amended) The method of claim 1, wherein the minimum average product distance is calculated by

$$pd_{\delta,avg}^{-1} == \sum_{\text{all incorrect path of } \delta} \prod_{t \in \eta} \left\| c_t - c_t' \right\|^{-2}$$

where $pd_{\delta,avg}$ represents a minimum average product distance of an ~~STTC code~~ information data bit stream having a minimum effective length δ, η represents a set of all t's with $c_t \neq c_t$, c_t represents ~~the STTC code~~ a codeword comprised of a number of bits, and c_t' represents a defective codeword ~~STTC code for the STTC code~~ c_t.

3. (Currently Amended) The method of claim 1, wherein if the ~~first~~ number <u>of input bits</u>
<u>for an STTC encoder</u> is 2 and a modulation scheme previously set in the mobile communication
system is a 4-PSK (Phase Shift Keying) scheme, when an information data bit stream received at
a previous symbol time is 00 and information data bit streams received at a current symbol time
are 00, 01, 10 and 11, an STTC code of 00122032 is ~~selected~~<u>generated</u>; when an information data
bit stream received at a previous symbol time is 01 and information data bit streams received at a
current symbol time are 00, 01, 10 and 11, an STTC code of 02102230 is ~~selected~~<u>generated</u>;
when an information data bit stream received at a previous symbol time is 10 and information
data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of
23310311 is ~~selected~~<u>generated</u>; and when an information data bit stream received at a previous
symbol time is 11 and information data bit streams received at a current symbol time are 00, 01,
10 and 11, an STTC code of 21330113 is ~~selected~~<u>generated</u>.

4. (Currently Amended) The method of claim 1, wherein if the <u>number of input bits for an</u>
<u>STTC encoder</u> ~~first number~~ is 3 and a modulation scheme previously set in the mobile
communication system is a 4-PSK scheme, when an information data bit stream received at a
previous symbol time is 000 and information data bit streams received at a current symbol time
are 00, 01, 10 and 11, an STTC code of 00201232 is selected; when an information data bit
stream received at a previous symbol time is 001 and information data bit streams received at a
current symbol time are 00, 01, 10 and 11, an STTC code of 01211333 is ~~selected~~<u>generated</u>;
when an information data bit stream received at a previous symbol time is 010 and information
data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of
22023010 is ~~selected~~<u>generated</u>; when an information data bit stream received at a previous
symbol time is 011 and information data bit streams received at a current symbol time are 00, 01,
10 and 11, an STTC code of 23033111 is ~~selected~~<u>generated</u>; when an information data bit stream
received at a previous symbol time is 100 and information data bit streams received at a current
symbol time are 00, 01, 10 and 11, an STTC code of 02221030 is ~~selected~~<u>generated</u>; when an
information data bit stream received at a previous symbol time is 101 and information data bit
streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 03231131 is
~~selected~~<u>generated</u>; when an information data bit stream received at a previous symbol time is 110

and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 20003212 is ~~selected~~generated; and when an information data bit stream received at a previous symbol time is 111 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 21013313 is ~~selected~~generated.

5. (Currently Amended) The method of claim 1, wherein if the ~~first~~ number of input bits for encoder is 4 and a modulation scheme previously set in the mobile communication system is a 4-PSK scheme, when an information data bit stream received at a previous symbol time is 0000 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 00203212 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 0001 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 02223010 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 0010 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 21011333 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 0011 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 23031131 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 0100 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 12320020 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 0101 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 10300222 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 0110 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 33132101 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 0111 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 31112303 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 1000 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 20001232 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 1001 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of

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22021030 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 1010 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 01213313 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 1011 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 03233111 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 1100 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 32122000 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 1101 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 30102202 is ~~selected~~generated; when an information data bit stream received at a previous symbol time is 1110 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 13330121 is ~~selected~~generated; and when an information data bit stream received at a previous symbol time is 1111 and information data bit streams received at a current symbol time are 00, 01, 10 and 11, an STTC code of 11310323 is ~~selected~~generated.

6. (Currently Amended) An apparatus for generating a space-time trellis code (STTC) for maximizing space-time diversity gain and coding gain in a mobile communication system including at least two transmission antennas ~~and generating a second number of STTC codes with an information data bit stream upon receiving the information data bit stream comprised of a first number of bits~~, the STTC having an information data bit stream comprised of a number of bits, the apparatus comprising:

a controller for calculating a minimum effective length for each ~~of the STTC codes~~ information data bit stream, calculating product distances between ~~all STTC codes~~ information data bit streams having a length equal to the minimum effective length, wherein for each pair ~~of pairs~~ of all initial states and all end states for each of the ~~STTC codes~~ the information data bit streams, initial states are identical to end states, summing reciprocals of the calculated product distances ~~between all the STTC codes for each of the STTC codes~~, calculating minimum average product distances by determining a reciprocal

of the summation result; and ~~as an STTC code corresponding to the information data bit stream~~

an STTC encoder for receiving the ~~information data bit stream~~ <u>calculated minimum average products distances</u> and <u>generating as an STTC code corresponding to an information data bit stream having a maximum value among the minimum average product distances</u>~~generating as an STTC code of the information data bit stream an STTC code corresponding to the minimum average product distance~~<u>.</u>

7. (Currently Amended) The apparatus of claim 6, wherein the controller calculates the minimum average product distance according to the following equation.

$$pd_{\delta,avg}^{-1} = \sum_{\text{all incorrect path of } \delta} \prod_{t\in\eta} \left\| c_t - c_t' \right\|^{-2}$$

where $pd_{\delta,avg}$ represents a minimum average product distance of ~~an STTC code~~ <u>the information data bit stream</u> having a minimum effective length δ, η represents a set of all t's with $c_t{\neq}c_t$, c_t represents ~~the STTC code~~<u>a codeword</u>, and c_t' represents a defective <u>codeword</u> ~~STTC code for the STTC code~~ c_t.

8-10. (Cancelled)

11. (New) The apparatus of claim 6, wherein the controller is located at the STTC encoder.

12. (New) An apparatus for maximizing space-time diversity gain and coding gain in a mobile communication system including at least two transmission antennas and a space-time trellis code (STTC) encoder, the apparatus comprising:

means for converting an information data bit stream into a plurality of sets of data bits;

a STTC encoder for operating on the plurality of sets of data bits to produce data symbols from the information data bit stream with a maximum value among minimum average product distances between information data bit streams, by calculating a minimum effective length for each information data bit stream, calculating product distances between the information data bit

streams, summing reciprocals of the calculated product distances, and calculating minimum average product distances from the summation result;

a modulator to produce modulated data symbols corresponding to an spread spectrum code of the data symbols; and

means to switch the modulated data symbols to each of the at least two transmission antennas.

13. (New) the apparatus of claim 12, wherein when calculating the minimum effective length for each information data bits stream, for each pair of all initial states and all end states for each information data bit stream, initial states are identical to end states.